

WHAT IS CLAIMED IS:

1. A developer for developing an electrostatic latent image, including: toner particles each comprising a binder resin and a colorant, inorganic  
5 fine powder having a number-average particle size of 4 - 80 nm based on primary particles, and electroconductive fine powder; wherein the developer has a number-basis particle size distribution in the range of 0.60 - 159.21  $\mu\text{m}$  including 15 - 60 % by  
10 number of particles in the range of 1.00 - 2.00  $\mu\text{m}$ , and 15 - 70 % by number of particles in the range of 3.00 - 8.96  $\mu\text{m}$ , each particle size range including its lower limit and excluding its upper limit.
- 15 2. The developer according to Claim 1, wherein the developer contains 20 - 50 % by number of particles in the range of 1.00 - 2.00  $\mu\text{m}$ .
- 20 3. The developer according to Claim 1, wherein the developer contains 0 - 20 % by number of particles in the range of at least 8.96  $\mu\text{m}$ .
- 25 4. The developer according to Claim 1, wherein the developer contains A % by number of particles in the range of 1.00 - 2.00  $\mu\text{m}$  and B % by number of particles in the range of 2.00 - 3.00  $\mu\text{m}$ , satisfying a relationship of  $A > 2B$ .

5. The developer according to Claim 1, wherein the developer has a variation coefficient of number-basis distribution  $Kn$  as defined below of 5 - 40 in the particle size range of 3.00 - 15.04  $\mu m$ .

5  $Kn = (Sn/D1) \times 100,$

wherein  $Sn$  represents a standard deviation of number basis distribution and  $D1$  represents a number-average circle-equivalent diameter ( $\mu m$ ), respectively, in the range of 3.00 - 15.04  $\mu m$ .

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6. The developer according to Claim 1, wherein the developer contains 90 - 100 % by number of particles having a circularity  $\underline{a}$  of at least 0.90 as determined by the following formula in the particle size range of 3.00 - 15.04  $\mu m$ :

15  $Circularity \underline{a} = L_0/L,$

wherein  $L$  denotes a circumferential length of a particle projection image, and  $L_0$  denotes a circumferential length of a circle having an area identical to that of the particle projection image.

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7. The developer according to Claim 6, wherein the developer contains 93 - 100 % by number of particles having a circularity  $\underline{a}$  of at least 0.90.

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8. The developer according to Claim 1, wherein the developer has a standard deviation of circularity

distribution SD of at most 0.045 as determined according to the following formula:

$$SD = [\Sigma(a_i - a_m)^2 / n]^{1/2},$$

wherein  $a_i$  represents a circularity of each particle,  
5  $a_m$  represents an average circularity and  $n$  represents a number of total particles, respectively in the particle size range of 3.00 - 15.04  $\mu\text{m}$ .

9. The developer according to Claim 1, wherein  
10 the developer contains 5 - 300 particles of the electroconductive fine powder having a particle size in the range of 0.6 - 3  $\mu\text{m}$  per 100 toner articles.

10. The developer according to Claim 1, wherein  
15 the developer contains 1 - 10 wt. % thereof of the electroconductive fine powder.

11. The developer according to Claim 1, wherein electroconductive fine powder has a resistivity of at  
20 most  $10^9$  ohm.cm.

12. The developer according to Claim 1, wherein the electroconductive fine powder has a resistivity of at most  $10^6$  ohm.cm.

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13. The developer according to Claim 1, wherein the electroconductive fine powder is non-magnetic.

14. The developer according to Claim 1, wherein the electroconductive fine powder comprises at least one species of oxide selected from the group consisting of zinc oxide, tin oxide and titanium  
5 oxide.

15. The developer according to Claim 1, wherein the developer contains 0.1 - 3.0 wt. % thereof of the inorganic fine powder.  
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16. The developer according to Claim 1, wherein the inorganic fine powder has been treated with at least silicone oil.

15 17. The developer according to Claim 1, wherein the inorganic fine powder has been treated with a silane compound simultaneously with or followed by treatment with silicone oil.

20 18. The developer according to Claim 1, wherein the inorganic fine powder comprises at least one species of inorganic oxides selected from the group consisting of silica, titania and alumina.

25 19. The developer according to Claim 1, wherein the developer is a magnetic developer having a magnetization of 10 - 40 Am<sup>2</sup>/kg at a magnetic field of

79.6 kA/m.

20. The developer according to Claim 1, wherein  
the electroconductive fine powder is non-  
5 magnetic and has a resistivity of at most  $10^9$  ohm.cm,  
the electroconductive fine powder is  
contained in 1 - 10 wt. % of the developer,  
the electroconductive fine powder contains 5  
- 300 particles having a particle size in the range of  
10 0.6 - 3  $\mu$ m per 100 toner particles;  
the inorganic fine powder is hydrophobic  
inorganic fine powder selected from the group  
consisting of silica treated with silicone oil, silica  
treated with a silane compound, titania treated with  
15 silicone oil, titania treated with a silane compound,  
alumina treated with silicone oil, and alumina treated  
with a silane compound, and  
the inorganic fine powder is contained in 0.1  
- 30 wt. % of the developer.

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21. The developer according to Claim 20, wherein  
the developer has a volume-average particle size of 4  
- 10  $\mu$ m, and the electroconductive fine powder has a  
resistivity of  $10^1$  to  $10^6$  ohm.cm.

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22. An image forming method, comprising a  
repetition of image forming cycles each including:

a charging step of charging an image-bearing member,

a latent image forming step of writing image data onto the charged surface of the image-bearing  
5 member to form an electrostatic latent image thereon,

a developing step of developing the electrostatic latent image with a developer to form a toner image thereon, and

a transfer step of transferring the toner  
10 image onto a transfer(-receiving) material;

wherein said developer includes toner particles each comprising a binder resin and a colorant, inorganic fine powder having a number-average particle size of 4 - 80 nm based on primary  
15 particles, and electroconductive fine powder; said developer having a number-basis particle size distribution in the range of 0.60 - 159.21  $\mu\text{m}$  including 15 - 60 % by number of particles in the range of 1.00 - 2.00  $\mu\text{m}$ , and 15 - 70 % by number of  
20 particles in the range of 3.00 - 8.96  $\mu\text{m}$ , each particle size range including its lower limit and excluding its upper limit; and

in the above-mentioned charging step, a charging member is caused to contact the image-bearing  
25 member at a contact position in the presence of at least the electroconductive fine powder of the developer, and in this contact state, the charging

member is supplied with a voltage to charge the image-bearing member.

23. The method according to Claim 22, wherein the  
5 developer contains 20 - 50 % by number of particles in the range of 1.00 - 2.00  $\mu\text{m}$ .

24. The method according to Claim 22, wherein the  
10 developer contains 0 - 20 % by number of particles in the range of at least 8.96  $\mu\text{m}$ .

25. The method according to Claim 22, wherein the  
15 developer contains A % by number of particles in the range of 1.00 - 2.00  $\mu\text{m}$  and B % by number of particles in the range of 2.00 - 3.00  $\mu\text{m}$ , satisfying a relationship of  $A > 2B$ .

26. The method according to Claim 22, wherein the  
20 developer has a variation coefficient of number-basis distribution  $K_n$  as defined below of 5 - 40 in the particle size range of 3.00 - 15.04  $\mu\text{m}$ .

$$K_n = (S_n/D_1) \times 100,$$

wherein  $S_n$  represents a standard deviation of number basis distribution and  $D_1$  represents a number-average  
25 circle-equivalent diameter ( $\mu\text{m}$ ), respectively, in the range of 3.00 - 15.04  $\mu\text{m}$ .

27. The method according to Claim 22, wherein the developer contains 90 - 100 % by number of particles having a circularity  $\underline{a}$  of at least 0.90 as determined by the following formula in the particle size range of  
5 3.00 - 15.04  $\mu\text{m}$ :

$$\text{Circularity } \underline{a} = L_0/L,$$

wherein L denotes a circumferential length of a particle projection image, and  $L_0$  denotes a circumferential length of a circle having an area  
10 identical to that of the particle projection image.

28. The method according to Claim 27, wherein the developer contains 93 - 100 % by number of particles having a circularity  $\underline{a}$  of at least 0.90.  
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29. The method according to Claim 22, wherein the developer has a standard deviation of circularity distribution SD of at most 0.045 as determined according to the following formula:

$$20 \quad SD = [\Sigma(a_i - a_m)^2/n]^{1/2},$$

wherein  $a_i$  represents a circularity of each particle,  $a_m$  represents an average circularity and n represents a number of total particles, respectively in the particle size range of 3.00 - 15.04  $\mu\text{m}$ .

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30. The method according to Claim 22, wherein the developer contains 5 - 300 particles of the



electroconductive fine powder having a particle size  
in the range of 0.6 - 3  $\mu\text{m}$  per 100 toner articles.

31. The method according to Claim 22, wherein the  
5 developer contains 1 - 10 wt. % thereof of the  
electroconductive fine powder.

32. The method according to Claim 22, wherein  
electroconductive fine powder has a resistivity of at  
10 most  $10^9$  ohm.cm.

33. The method according to Claim 22, wherein the  
electroconductive fine powder has a resistivity of at  
most  $10^6$  ohm.cm.

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34. The method according to Claim 22, wherein the  
electroconductive fine powder is non-magnetic.

35. The method according to Claim 22, wherein the  
20 electroconductive fine powder comprises at least one  
species of oxide selected from the group consisting of  
zinc oxide, tin oxide and titanium oxide.

36. The method according to Claim 22, wherein the  
25 developer contains 0.1 - 3.0 wt. % thereof of the  
inorganic fine powder.

37. The method according to Claim 22, wherein the inorganic fine powder has been treated with at least silicone oil.

5        38. The method according to Claim 22, wherein the inorganic fine powder has been treated with a silane compound simultaneously with or followed by treatment with silicone oil.

10       39. The method according to Claim 22, wherein the inorganic fine powder comprises at least one species of inorganic oxides selected from the group consisting of silica, titania and alumina.

15       40. The method according to Claim 22, wherein the developer is a magnetic developer having a magnetization of  $10 - 40 \text{ Am}^2/\text{kg}$  at a magnetic field of  $79.6 \text{ kA/m}$ .

20       41. The method according to Claim 22, wherein  
the electroconductive fine powder is non-magnetic and has a resistivity of at most  $10^9 \text{ ohm.cm}$ ,  
the electroconductive fine powder is contained in  $1 - 10 \text{ wt. \%}$  of the developer,  
25       the electroconductive fine powder contains  $5 - 300$  particles having a particle size in the range of  $0.6 - 3 \text{ }\mu\text{m}$  per 100 toner particles;

the inorganic fine powder is hydrophobic  
inorganic fine powder selected from the group  
consisting of silica treated with silicone oil, silica  
treated with a silane compound, titania treated with  
5 silicone oil, titania treated with a silane compound,  
alumina treated with silicone oil, and alumina treated  
with a silane compound, and

the inorganic fine powder is contained in 0.1  
- 30 wt. % of the developer.

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42. The method according to Claim 41, wherein the  
developer has a volume-average particle size of 4 - 10  
 $\mu\text{m}$ , and the electroconductive fine powder has a  
resistivity of  $10^0$  to  $10^5$  ohm.cm.

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43. The method according to Claim 22, wherein the  
electroconductive fine powder is present at the  
contact position between the charging member and the  
image-bearing member at a proportion higher than the  
20 content thereof in the developer initially supplied to  
the developing step.

44. The method according to Claim 22, wherein the  
developing step of developing or visualizing the  
25 electrostatic latent image is also operated as a step  
of recovering the developer remaining on the image-  
bearing member surface after the toner image is

transferred to the transfer material.

45. The method according to Claim 22, wherein a relative speed difference is provided between the surface moving speed of the charging member and the surface-moving speed of the image-bearing member at the contact position.

46. The method according to Claim 22, wherein the charging member is moved in a surface moving direction opposite to that of the image bearing member.

47. The method according to Claim 22, wherein in the charging step, the image-bearing member is charged by means of a roller charging member having at least a surface layer of a foam material.

48. The method according to Claim 22, wherein in the charging step, the image-bearing member is charged by a roller charging member having an Asker C hardness of 25 - 50 supplied with a voltage.

49. The method according to Claim 22, wherein the image-bearing member is charged by a roller charging member has a volume resistivity of  $10^3 - 10^8$  ohm.cm.

50. The method according to Claim 22, wherein the

image-bearing member is charged by means of a brush member having electroconductivity and supplied with a voltage.

5        51. The method according to Claim 22, wherein the image-bearing member has a volume resistivity of  $1 \times 10^9$  -  $1 \times 10^{14}$  ohm.cm at its surfacemost layer.

10        52. The method according to Claim 22, wherein the image-bearing member has a surfacemost layer comprising a resin with metal oxide conductor particles dispersed therein.

15        53. The method according to Claim 22, wherein the image-bearing member has a surface exhibiting a contact angle with water of at least 85 deg.

20        54. The method according to Claim 22, wherein the image-bearing member has a surfacemost layer containing fine particles of a lubricant selected from fluorine-containing resin, silicone resin and polyolefin resin.

25        55. The method according to Claim 22, wherein in the developing step, a developer-carrying member carrying the developer is disposed opposite to and with a spacing of 100 - 1000  $\mu$ m from the image-bearing

member.

56. The method according to Claim 22, wherein in the developing step, the developer is carried in a density of 5 - 30 g/m<sup>2</sup> on a developer-carrying member to form a developer layer, from which the developer is transferred to the image-bearing member.

57. The method according to Claim 22, wherein in the developing step, the developer-carrying member is disposed with a prescribed spacing from the image-bearing member, the developer layer is formed in a thickness smaller than the spacing, and the developer is electrically transferred from the developer layer to the image-bearing member.

58. The method according to Claim 22, wherein in the developing step, a developing bias voltage is applied so as to form an AC electric field having a peak-to-peak field strength of  $3 \times 10^6$  -  $10 \times 10^6$  volts/m and a frequency of 100 - 5000 Hz between the developer-carrying member and the image-bearing member.

59. The method according to Claim 22, wherein in the transfer step, the toner image formed in the developing step is first transferred onto an

intermediate transfer member and then onto the transfer material.

60. The method according to Claim 22, wherein in  
5 the transfer step, the transfer of the toner image is effected while abutting a transfer member against the image-bearing member or the intermediate transfer member via the transfer material.

10 61. An image forming method, comprising a repetition of image forming cycles each including:  
a charging step of charging an image-bearing member,  
a latent image-forming step of writing image  
15 data onto the charged surface of the image-bearing member to form an electrostatic latent image thereon,  
a developing step of developing the electrostatic latent image with a developer to form a toner image thereon, and  
20 a transfer step of transferring the toner image onto a transfer(-receiving) material,  
wherein the developing step is a step of developing the electrostatic latent image to form the toner image and also a step of recovering the  
25 developer remaining on the image-bearing member after the toner image is transferred onto the transfer material; and

said developer includes toner particles each comprising a binder resin and a colorant, inorganic fine powder having a number-average particle size of 4 - 80 nm based on primary particles, and  
5 electroconductive fine powder; wherein the developer has a number-basis particle size distribution in the range of 0.60 - 159.21  $\mu\text{m}$  including 15 - 60 % by number of particles in the range of 1.00 - 2.00  $\mu\text{m}$ , and 15 - 70 % by number of particles in the range of  
10 3.00 - 8.96  $\mu\text{m}$ , each particle size range including its lower limit and excluding its upper limit.

62. The method according to Claim 61, wherein the developer contains 20 - 50 % by number of particles in  
15 the range of 1.00 - 2.00  $\mu\text{m}$ .

63. The method according to Claim 61, wherein the developer contains 0 - 20 % by number of particles in the range of at least 8.96  $\mu\text{m}$ .  
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64. The method according to Claim 61, wherein the developer contains A % by number of particles in the range of 1.00 - 2.00  $\mu\text{m}$  and B % by number of particles in the range of 2.00 - 3.00  $\mu\text{m}$ , satisfying a  
25 relationship of  $A > 2B$ .

65. The method according to Claim 61, wherein the



developer has a variation coefficient of number-basis distribution  $K_n$  as defined below of 5 - 40 in the particle size range of 3.00 - 15.04  $\mu\text{m}$ .

$$K_n = (S_n/D_1) \times 100,$$

5 wherein  $S_n$  represents a standard deviation of number basis distribution and  $D_1$  represents a number-average circle-equivalent diameter ( $\mu\text{m}$ ), respectively, in the range of 3.00 - 15.04  $\mu\text{m}$ .

10 66. The method according to Claim 61, wherein the developer contains 90 - 100 % by number of particles having a circularity  $\underline{a}$  of at least 0.90 as determined by the following formula in the particle size range of 3.00 - 15.04  $\mu\text{m}$ :

15       Circularity  $\underline{a} = L_0/L,$

wherein  $L$  denotes a circumferential length of a particle projection image, and  $L_0$  denotes a circumferential length of a circle having an area identical to that of the particle projection image.

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67. The method according to Claim 66, wherein the developer contains 93 - 100 % by number of particles having a circularity  $\underline{a}$  of at least 0.90.

25 68. The method according to Claim 61, wherein the developer has a standard deviation of circularity distribution  $SD$  of at most 0.045 as determined

according to the following formula:

$$SD = [\Sigma(a_i - a_m)^2/n]^{1/2},$$

wherein  $a_i$  represents a circularity of each particle,  
 $a_m$  represents an average circularity and  $n$  represents  
5 a number of total particles, respectively in the  
particle size range of 3.00 - 15.04  $\mu\text{m}$ .

69. The method according to Claim 61, wherein the  
developer contains 5 - 300 particles of the  
10 electroconductive fine powder having a particle size  
in the range of 0.6 - 3  $\mu\text{m}$  per 100 toner articles.

70. The method according to Claim 61, wherein the  
developer contains 1 - 10 wt. % thereof of the  
15 electroconductive fine powder.

71. The method according to Claim 61, wherein  
electroconductive fine powder has a resistivity of at  
most  $10^9$  ohm.cm.

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72. The method according to Claim 61, wherein the  
electroconductive fine powder has a resistivity of at  
most  $10^6$  ohm.cm.

25 73. The method according to Claim 61, wherein the  
electroconductive fine powder is non-magnetic.

74. The method according to Claim 61, wherein the electroconductive fine powder comprises at least one species of oxide selected from the group consisting of zinc oxide, tin oxide and titanium oxide.

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75. The method according to Claim 61, wherein the developer contains 0.1 - 3.0 wt. % thereof of the inorganic fine powder.

10 76. The method according to Claim 61, wherein the inorganic fine powder has been treated with at least silicone oil.

15 77. The method according to Claim 61, wherein the inorganic fine powder has been treated with a silane compound simultaneously with or followed by treatment with silicone oil.

20 78. The method according to Claim 61, wherein the inorganic fine powder comprises at least one species of inorganic oxides selected from the group consisting of silica, titania and alumina.

25 79. The method according to Claim 61, wherein the developer is a magnetic developer having a magnetization of 10 - 40 Am<sup>2</sup>/kg at a magnetic field of 79.6 kA/m.

80. The method according to Claim 61, wherein  
the electroconductive fine powder is non-  
magnetic and has a resistivity of at most  $10^9$  ohm.cm,

the electroconductive fine powder is  
5 contained in 1 - 10 wt. % of the developer,

the electroconductive fine powder contains 5  
- 300 particles having a particle size in the range of  
0.6 - 3  $\mu$ m per 100 toner particles;

the inorganic fine powder is hydrophobic  
10 inorganic fine powder selected from the group  
consisting of silica treated with silicone oil, silica  
treated with a silane compound, titania treated with  
silicone oil, titania treated with a silane compound,  
alumina treated with silicone oil, and alumina treated  
15 with a silane compound, and

the inorganic fine powder is contained in 0.1  
- 30 wt. % of the developer.

81. The method according to Claim 80, wherein the  
20 developer has a volume-average particle size of 4 - 10  
 $\mu$ m, and the electroconductive fine powder has a  
resistivity of  $10^0$  to  $10^5$  ohm.cm.

82. The method according to Claim 61, wherein in  
25 the charging step, the image-bearing member is charged  
by means of a charging member contacting the image-  
bearing member.

83. A process-cartridge detachably mountable to a main assembly of an image forming apparatus for developing an electrostatic latent image formed on an image-bearing member with a developer to form a toner  
5 image, transferring the toner image onto a transfer(-receiving) material, and fixing the toner image on the transfer material, wherein the process-cartridge includes:

an image-bearing member for bearing an  
10 electrostatic latent image thereon,

a charging means for charging the image-bearing member, and

a developing means for developing the electrostatic latent image on the image-bearing member  
15 to form a toner image;

the charging means includes a charging member disposed to contact the image-bearing member and supplied with a voltage to charge the image-bearing member at a contact position where at least the  
20 electroconductive fine powder of the developer is co-present as a portion of the developer attached to and allowed to remain on the image-bearing member after transfer of the toner image by the transfer means; and

the developer includes toner particles each  
25 comprising a binder resin and a colorant, inorganic fine powder having a number-average particle size of 4 - 80 nm based on primary particles, and

electroconductive fine powder; wherein the developer has a number-basis particle size distribution in the range of 0.60 - 159.21  $\mu\text{m}$  including 15 - 60 % by number of particles in the range of 1.00 - 2.00  $\mu\text{m}$ ,  
5 and 15 - 70 % by number of particles in the range of 3.00 - 8.96  $\mu\text{m}$ , each particle size range including its lower limit and excluding its upper limit.

84. The process-cartridge according to Claim 83,  
10 wherein the developing means includes at least a developer-carrying member disposed opposite to the image-bearing member, and a developer layer-regulating member for forming a thin developer layer on the developer-carrying member, so that the developer is  
15 transferred from the developer layer on the developer-carrying member onto the image-bearing member to form the toner image.

85. The process-cartridge according to Claim 83,  
20 wherein the developer contains 20 - 50 % by number of particles in the range of 1.00 - 2.00  $\mu\text{m}$ .

✓ 86. The process-cartridge according to Claim 83,  
wherein the developer contains 0 - 20 % by number of  
25 particles in the range of at least 8.96  $\mu\text{m}$ .

87. The process-cartridge according to Claim 83,

wherein the developer contains A % by number of particles in the range of 1.00 - 2.00  $\mu\text{m}$  and B % by number of particles in the range of 2.00 - 3.00  $\mu\text{m}$ , satisfying a relationship of  $A > 2B$ .

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88. The process-cartridge according to Claim 83, wherein the developer has a variation coefficient of number-basis distribution  $K_n$  as defined below of 5 - 40 in the particle size range of 3.00 - 15.04  $\mu\text{m}$ .

10  $K_n = (S_n/D_1) \times 100,$

wherein  $S_n$  represents a standard deviation of number basis distribution and  $D_1$  represents a number-average circle-equivalent diameter ( $\mu\text{m}$ ), respectively, in the range of 3.00 - 15.04  $\mu\text{m}$ .

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89. The process-cartridge according to Claim 83, wherein the developer contains 90 - 100 % by number of particles having a circularity  $\underline{a}$  of at least 0.90 as determined by the following formula in the particle size range of 3.00 - 15.04  $\mu\text{m}$ :

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$$\text{Circularity } \underline{a} = L_0/L,$$

wherein  $L$  denotes a circumferential length of a particle projection image, and  $L_0$  denotes a circumferential length of a circle having an area

25 identical to that of the particle projection image.

90. The process-cartridge according to Claim 89,

wherein the developer contains 93 - 100 % by number of particles having a circularity a of at least 0.90.

91. The process-cartridge according to Claim 83,  
5 wherein the developer has a standard deviation of circularity distribution SD of at most 0.045 as determined according to the following formula:

$$SD = [\Sigma(a_i - a_m)^2 / n]^{1/2},$$

wherein  $a_i$  represents a circularity of each particle,  
10  $a_m$  represents an average circularity and  $n$  represents a number of total particles, respectively in the particle size range of 3.00 - 15.04  $\mu\text{m}$ .

92. The process-cartridge according to Claim 83,  
15 wherein the developer contains 5 - 300 particles of the electroconductive fine powder having a particle size in the range of 0.6 - 3  $\mu\text{m}$  per 100 toner articles.

20 93. The process-cartridge according to Claim 83, wherein the developer contains 1 - 10 wt. % thereof of the electroconductive fine powder.

94. The process-cartridge according to Claim 83,  
25 wherein electroconductive fine powder has a resistivity of at most  $10^9$  ohm.cm.



95. The process-cartridge according to Claim 83,  
wherein the electroconductive fine powder has a  
resistivity of at most  $10^6$  ohm.cm.

5        96. The process-cartridge according to Claim 83,  
wherein the electroconductive fine powder is non-  
magnetic.

10       97. The process-cartridge according to Claim 83,  
wherein the electroconductive fine powder comprises at  
least one species of oxide selected from the group  
consisting of zinc oxide, tin oxide and titanium  
oxide.

15       98. The process-cartridge according to Claim 83,  
wherein the developer contains 0.1 - 3.0 wt. % thereof  
of the inorganic fine powder.

20       99. The process-cartridge according to Claim 83,  
wherein the inorganic fine powder has been treated  
with at least silicone oil.

25       100. The process-cartridge according to Claim 83,  
wherein the inorganic fine powder has been treated  
with a silane compound simultaneously with or followed  
by treatment with silicone oil.

101. The process-cartridge according to Claim 83, wherein the inorganic fine powder comprises at least one species of inorganic oxides selected from the group consisting of silica, titania and alumina.

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102. The process-cartridge according to Claim 83, wherein the developer is a magnetic developer having a magnetization of  $10 - 40 \text{ Am}^2/\text{kg}$  at a magnetic field of  $79.6 \text{ kA/m}$ .

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103. The process-cartridge according to Claim 83, wherein

the electroconductive fine powder is non-magnetic and has a resistivity of at most  $10^9 \text{ ohm.cm}$ ,

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the electroconductive fine powder is contained in  $1 - 10 \text{ wt. \%}$  of the developer,

the electroconductive fine powder contains  $5 - 300$  particles having a particle size in the range of  $0.6 - 3 \text{ }\mu\text{m}$  per 100 toner particles;

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the inorganic fine powder is hydrophobic inorganic fine powder selected from the group consisting of silica treated with silicone oil, silica treated with a silane compound, titania treated with silicone oil, titania treated with a silane compound, alumina treated with silicone oil, and alumina treated with a silane compound, and

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the inorganic fine powder is contained in  $0.1$

- 30 wt. % of the developer.

104. The process-cartridge according to Claim 104,  
wherein the developer has a volume-average particle  
5 size of 4 - 10  $\mu\text{m}$ , and the electroconductive fine  
powder has a resistivity of  $10^0$  to  $10^5$  ohm.cm.

105. The process-cartridge according to Claim 83,  
wherein the electroconductive fine powder is present  
10 at the contact position between the charging member  
and the image-bearing member at a proportion higher  
than the content thereof in the developer initially  
supplied to the developing step.

15 106. The process-cartridge according to Claim 83,  
wherein the developing step of developing or  
visualizing the electrostatic latent image is also  
operated as a step of recovering the developer  
remaining on the image-bearing member surface after  
20 the toner image is transferred to the transfer  
material.

107. The process-cartridge according to Claim 83,  
wherein a relative speed difference is provided  
25 between the surface moving speed of the charging  
member and the surface-moving speed of the image-  
bearing member at the contact position.

108. The process-cartridge according to Claim 83,  
wherein the charging member is moved in a surface  
moving direction opposite to that of the image bearing  
5 member.

109. The process-cartridge according to Claim 83,  
wherein [in the charging step, the image-bearing member  
is charged by means of] <sup>the image-bearing member</sup> a roller charging member having  
10 at least a surface layer of a foam material.

110. The process-cartridge according to Claim 83,  
wherein [in the charging step, the image-bearing member  
is charged by] <sup>the image-bearing member</sup> a roller charging member having an Asker  
15 C hardness of 25 - 50 supplied with a voltage.

111. The process-cartridge according to Claim 83,  
wherein [the image-bearing member is charged by] <sup>the image-bearing member</sup> a  
roller charging member has a volume resistivity of  $10^3$   
20 -  $10^8$  ohm.cm.

112. The process-cartridge according to Claim 83,  
wherein [the image-bearing member is charged by means <sup>the image-bearing member</sup>  
of] a brush member having electroconductivity and  
25 supplied with a voltage.

113. The process-cartridge according to Claim 83,

wherein the image-bearing member has a volume resistivity of  $1 \times 10^9$  -  $1 \times 10^{14}$  ohm.cm at its surfacemost layer.

5        114. The process-cartridge according to Claim 83, wherein the image-bearing member has a surfacemost layer comprising a resin with metal oxide conductor particles dispersed therein.

10       115. The process-cartridge according to Claim 83, wherein the image-bearing member has a surface exhibiting a contact angle with water of at least 85 deg.

15       116. The process-cartridge according to Claim 83, wherein the image-bearing member has a surfacemost layer containing fine particles of a lubricant selected from fluorine-containing resin, silicone resin and polyolefin resin.

20       117. The process-cartridge according to Claim 83, wherein in the developing step, a developer-carrying member carrying the developer is disposed opposite to and with a spacing of 100 - 1000  $\mu$ m from the image-  
25 bearing member.

118. The process-cartridge according to Claim 83,

wherein in the developing step, the developer is carried in a density of 5 - 30 g/m<sup>2</sup> on a developer-carrying member to form a developer layer, from which the developer is transferred to the image-bearing member.

119. The process-cartridge according to Claim 83, wherein in the developing step, the developer-carrying member is disposed with a prescribed spacing from the image-bearing member, the developer layer is formed in a thickness smaller than the spacing, and the developer is electrically transferred from the developer layer to the image-bearing member.

120. The process-cartridge according to Claim 83, wherein in the developing step, a developing bias voltage is applied so as to form an AC electric field having a peak-to-peak field strength of  $3 \times 10^6$  -  $10 \times 10^6$  volts/m and a frequency of 100 - 5000 Hz between the developer-carrying member and the image-bearing member.

121. The process-cartridge detachably mountable to a main assembly of an image forming apparatus for developing an electrostatic latent image formed on an image-bearing member with a developer to form a toner image and transferring the toner image onto a

transfer(-receiving) material, wherein the process-cartridge includes:

an image-bearing member for bearing an electrostatic latent image thereon,

5 a charging means for charging the image-bearing member, and

a developing means for developing the electrostatic latent image on the image-bearing member to form a toner image;

10 said developing means is a means for developing the electrostatic latent to form the toner image and also a means for recovering the developer remaining on the image-bearing member after the toner image is transferred onto the transfer material; and

15 said developer includes toner particles each comprising a binder resin and a colorant, inorganic fine powder having a number-average particle size of 4 - 80 nm based on primary particles, and electroconductive fine powder; wherein the developer  
20 has a number-basis particle size distribution in the range of 0.60 - 159.21  $\mu\text{m}$  including 15 - 60 % by number of particles in the range of 1.00 - 2.00  $\mu\text{m}$ , and 15 - 70 % by number of particles in the range of 3.00 - 8.96  $\mu\text{m}$ , each particle size range including its  
25 lower limit and excluding its upper limit.

122. The process-cartridge according to Claim 122,

wherein the developing means includes at least a developer-carrying member disposed opposite to the image-bearing member, and a developer layer-regulating member for forming a thin developer layer on the developer-carrying member, so that the developer is transferred from the developer layer on the developer-carrying member onto the image-bearing member to form the toner image.

10        123. The process-cartridge according to Claim 121, wherein the developer contains 20 - 50 % by number of particles in the range of 1.00 - 2.00  $\mu\text{m}$ .

15        124. The process-cartridge according to Claim 121, wherein the developer contains 0 - 20 % by number of particles in the range of at least 8.96  $\mu\text{m}$ .

20        125. The process-cartridge according to Claim 121, wherein the developer contains A % by number of particles in the range of 1.00 - 2.00  $\mu\text{m}$  and B % by number of particles in the range of 2.00 - 3.00  $\mu\text{m}$ , satisfying a relationship of  $A > 2B$ .

25        126. The process-cartridge according to Claim 121, wherein the developer has a variation coefficient of number-basis distribution  $K_n$  as defined below of 5 - 40 in the particle size range of 3.00 - 15.04  $\mu\text{m}$ .



$$Kn = (Sn/D1) \times 100,$$

wherein Sn represents a standard deviation of number basis distribution and D1 represents a number-average circle-equivalent diameter ( $\mu\text{m}$ ), respectively, in the  
5 range of 3.00 - 15.04  $\mu\text{m}$ .

127. The process-cartridge according to Claim 121, wherein the developer contains 90 - 100 % by number of particles having a circularity  $\underline{a}$  of at least 0.90 as  
10 determined by the following formula in the particle size range of 3.00 - 15.04  $\mu\text{m}$ :

$$\text{Circularity } \underline{a} = L_0/L,$$

wherein L denotes a circumferential length of a particle projection image, and  $L_0$  denotes a  
15 circumferential length of a circle having an area identical to that of the particle projection image.

128. The process-cartridge according to Claim 127, wherein the developer contains 93 - 100 % by number of  
20 particles having a circularity  $\underline{a}$  of at least 0.90.

✓ 129. The process-cartridge according to Claim 121, wherein the developer has a standard deviation of circularity distribution SD of at most 0.045 as  
25 determined according to the following formula:

$$SD = [\Sigma(a_i - a_m)^2/n]^{1/2},$$

wherein  $\underline{a}$  represents a circularity of each particle,

$a_m$  represents an average circularity and  $n$  represents a number of total particles, respectively in the particle size range of 3.00 - 15.04  $\mu\text{m}$ .

5        130. The process-cartridge according to Claim 121, wherein the developer contains 5 - 300 particles of the electroconductive fine powder having a particle size in the range of 0.6 - 3  $\mu\text{m}$  per 100 toner articles.

10

131. The process-cartridge according to Claim 121, wherein the developer contains 1 - 10 wt. % thereof of the electroconductive fine powder.

15        132. The process-cartridge according to Claim 121, wherein electroconductive fine powder has a resistivity of at most  $10^9$  ohm.cm.

20        133. The process-cartridge according to Claim 121, wherein the electroconductive fine powder has a resistivity of at most  $10^6$  ohm.cm.

25        134. The process-cartridge according to Claim 121, wherein the electroconductive fine powder is non-magnetic.

135. The process-cartridge according to Claim 121,

wherein the electroconductive fine powder comprises at least one species of oxide selected from the group consisting of zinc oxide, tin oxide and titanium oxide.

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136. The process-cartridge according to Claim 121, wherein the developer contains 0.1 - 3.0 wt. % thereof of the inorganic fine powder.

10

137. The process-cartridge according to Claim 121, wherein the inorganic fine powder has been treated with at least silicone oil.

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138. The process-cartridge according to Claim 121, wherein the inorganic fine powder has been treated with a silane compound simultaneously with or followed by treatment with silicone oil.

20

139. The process-cartridge according to Claim 121, wherein the inorganic fine powder comprises at least one species of inorganic oxides selected from the group consisting of silica, titania and alumina.

25

140. The process-cartridge according to Claim 121, wherein the developer is a magnetic developer having a magnetization of 10 - 40 Am<sup>2</sup>/kg at a magnetic field of 79.6 kA/m.

141. The process-cartridge according to Claim 121,  
wherein

the electroconductive fine powder is non-  
5 magnetic and has a resistivity of at most  $10^9$  ohm.cm,

the electroconductive fine powder is  
contained in 1 - 10 wt. % of the developer,

the electroconductive fine powder contains 5  
- 300 particles having a particle size in the range of  
10 0.6 - 3  $\mu$ m per 100 toner particles;

the inorganic fine powder is hydrophobic  
inorganic fine powder selected from the group  
consisting of silica treated with silicone oil, silica  
treated with a silane compound, titania treated with  
15 silicone oil, titania treated with a silane compound,  
alumina treated with silicone oil, and alumina treated  
with a silane compound, and

the inorganic fine powder is contained in 0.1  
- 30 wt. % of the developer.

20

142. The process-cartridge according to Claim 141,  
wherein the developer has a volume-average particle  
size of 4 - 10  $\mu$ m, and the electroconductive fine  
powder has a resistivity of  $10^0$  to  $10^5$  ohm.cm.

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143. The process-cartridge according to Claim 121,  
wherein said charging means is a contact charging

means including a charging member contacting said  
image-bearing member to the image bearing member.

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